SEME LAB

SYSTEMS DIVISION

PLASTIC OPTICAL COMPONENTS

IMAGING AND NON-IMAGING PLASTIC OPTICAL COMPONENTS

DESCRIPTION

Due to customer requests Semelab has developed the capability to design and supply polymer based optical components. These devices can be used to complement the range of optical sensors supplied by Semelab's Opto Division.

To date all clear optical components have been moulded in polycarbonate or acrylic (PMMA). We are able to add pigments to the clear polymer to provide simple bandpass or highpass optical filters in the visible and infra-red regions of the spectrum. For more demanding applications we can apply multi-layer dichroic filters to the external surfaces of the moulding or to the active surface of silicon photodiodes. These last filters feature sharper stopband to passband transitions and broader bandpass regions.

We can combine the products listed opposite to form complex optical assemblies. One such example is the use of multi-shot mould tools to form a clear lens and opaque aperture stop. With this process the clear polymer is first injected into the tool, then an opaque polymer is injected either around the clear polymer or into a different section of the tool. Similar processes can be used to manufacture light pipes and prismatic reflectors with high numerical apertures.

The service we offer ranges from initial simulation to prototype manufacture through to full production. For the initial design simulation we can in conjunction with our clients simulate the optical component and principal features of the system layout. For this purpose we use a combination of proprietary and custom software packages. For prototype manufacture we use either rapid prototyping methods or soft tooling depending upon the number required and the nature of the prototype. Production tooling can be single impression or multi-impression single or multi-shot tools.

Whilst the lists of products opposite is extensive, it is not exhaustive. Please contact Semelab for a confidential discussion of your requirement and an update on our capabilities.

FEATURES:

- **LOW COST**
- **HIGH PERFORMANCE**
- **MULTIPLE ELEMENTS**
- **MULTI-SHOT MOULDINGS**
- **COATINGS AVAILABLE**
- **LIGHT WEIGHT**
- **OPTICAL SIMULATION OF DESIGN PRIOR TO TOOLING AVAILABLE**
- **RAPID PROTOTYPING OF MOST COMPONENTS POSSIBLE**
- **SUITABLE FOR HIGH VOLUME MANUFACTURE**
- **COMMENSURATE WITH SEMELAB OPTICAL SENSORS AND MODULES**

APPLICATIONS:

- **LIGHT PIPES**
- **PRISMATIC REFLECTORS**
- **PLANO-CONVEX SPHERICAL LENSES**
- **BI-CONVEX SPHERICAL LENSES**
- **ASPHERIC LENSES**
- **LENS ARRAYS**
- **CYLINDRICAL LENSES**
- **LENTICULAR ARRAYS**
- **FRESNEL LENSES**
- **DIFFUSER ELEMENTS**
- **PRECISION APERTURES**
- **MIRROR SURFACES**

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ITEM	PRODUCT	DIMENSION		PARAMETER		COMBINED PRODUCTS
		DESCRIPTION	RANGE	DESCRIPTION	RANGE	
1	Light Pipes	Min. Size	> = 0.5mm	Materials	PC PMMA	2,3,7,9,10,11,12,1314
2	Prismatic Reflectors	Min. Size	> = 0.5mm	Materials	PC, PMMA	1,3,7,9,10,11,12,1314
3	Plano Lens	Lens Aperture	> = 0.5mm	f/Number	> =1	1,2,6,12,13,14
4	BI-Convex Lens	Lens Aperture	> = 0.5mm	f/Number	> =1	6,12,13,14
5	Aspheric Lens	Lens Aperture	> = 0.5mm	f/Number	> =0.8	6,12,13,14
6	Lens Arrays	Lens Aperture	> = 0.5mm	f/Number	> =1	1,2,3,4,5,9,11,12, 13,14
		Thickness	> = 0.5mm	Number of Elements	2 to n	
7	Cylindrical Lenses	Lens Aperture Aspect Ratio	> = 0.5mm <25	f/Number	> = 1	1,2,12,13,14
8	Lenticular Array	Lens Aperture	> = 0.5mm	f/Number	2 to n	1,2,12,13,14
		Thickness	> = 0.5mm	Number of Elements		
		Aspect Ration	<25			
9	Fresnel Lens	Lens Aperture	> = 0.5mm	f/Number	> =0.8	1,2,6,12,13,14
		Thickness	<25			
10	Diffuser Elements	Thickness	> = 0.5mm	Diffuser Angle	1 to 60^{o}	1,2,12,13,14
11	Parabolic Concentrator	Min. Size	5mm	N.A. Ratio	1 to 10	1,2,12,13,14
12	Optical Filters	Thickness	> = 0.5mm	Wavelength Range	350nm to 1200nm	1,2,3,4,5,6,7,8,9,10 11,13,14
13	Precision Apertures	Min. Size	0.1mm			1,2,3,4,5,6,7,8,9,10 11,12,13
14	Mirror Surfaces	Min. Size	1mm	Reflectance	>80%	1,2,3,4,5,6,7,8,9,10 11,12,13

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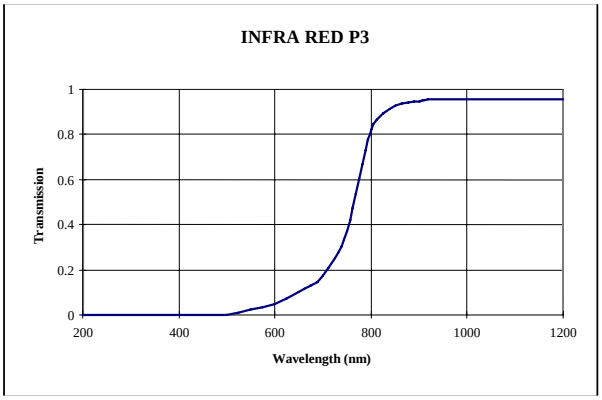
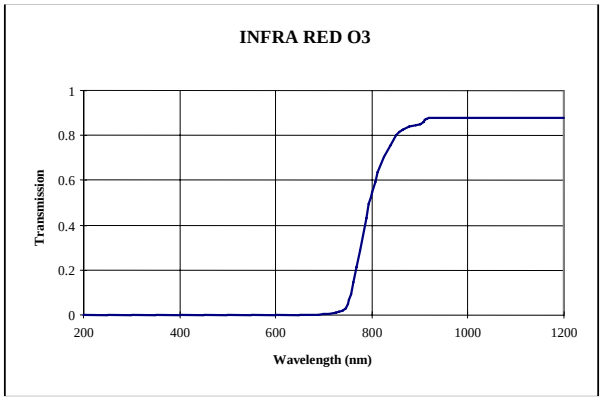
POLYMER PIGMENTS

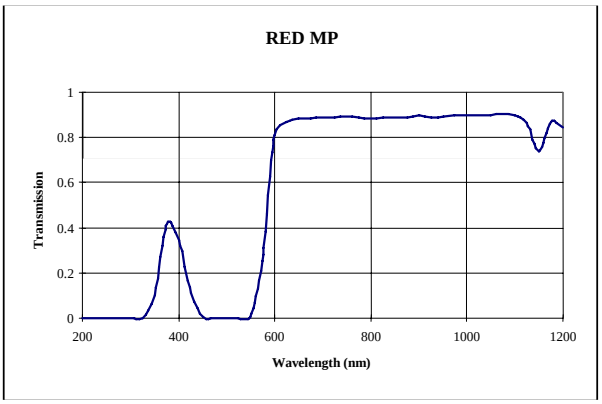
The following pigments can be used to modify the spectral transmission of clear polymers. By varying the percentage of the pigment the basic filter characteristics can be further modified.

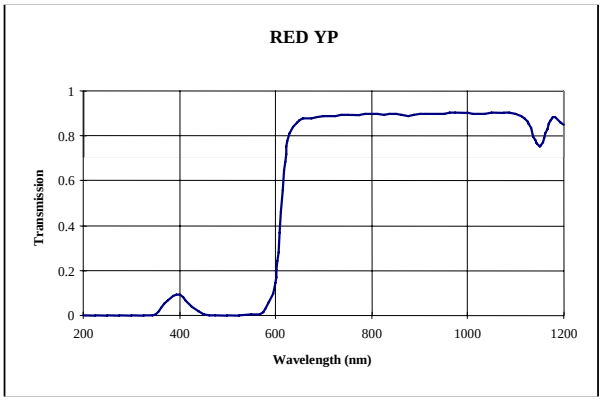
The process can be combined with dichroic filter deposition onto the polymer or the opto sensor for complementary filter characteristics.

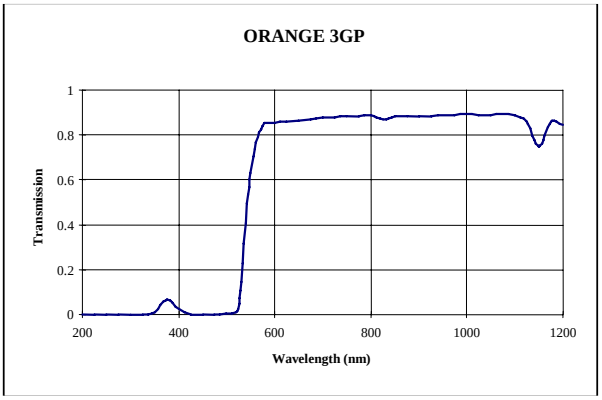
For more details of the filter permutations, please contact Semelab Plc.

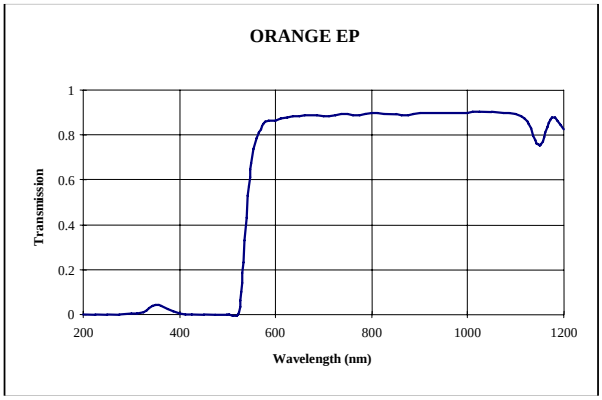












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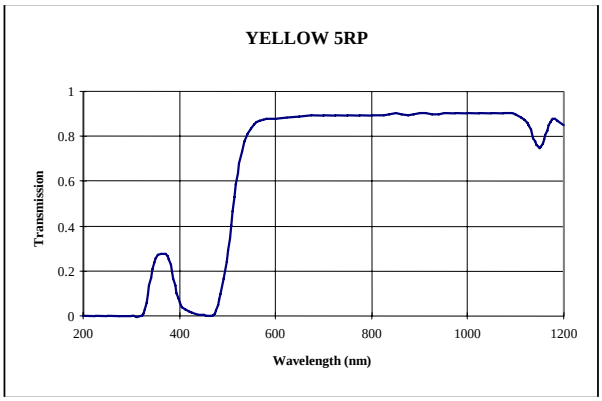

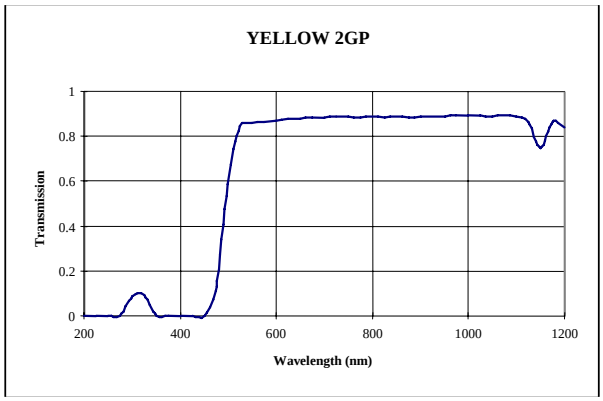

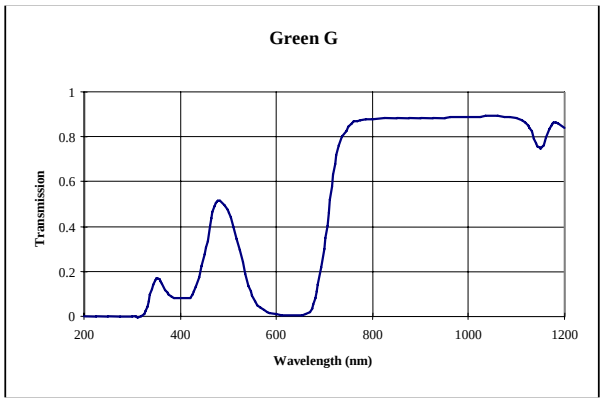

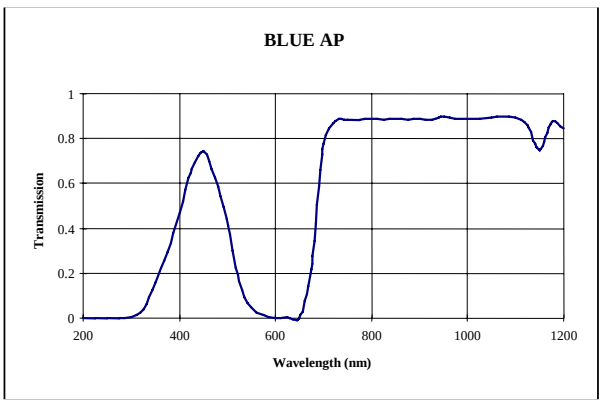

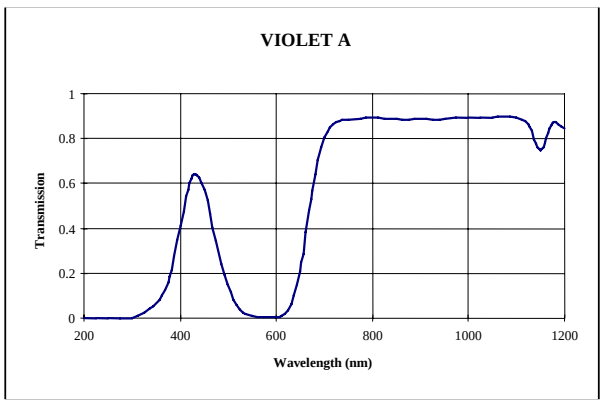

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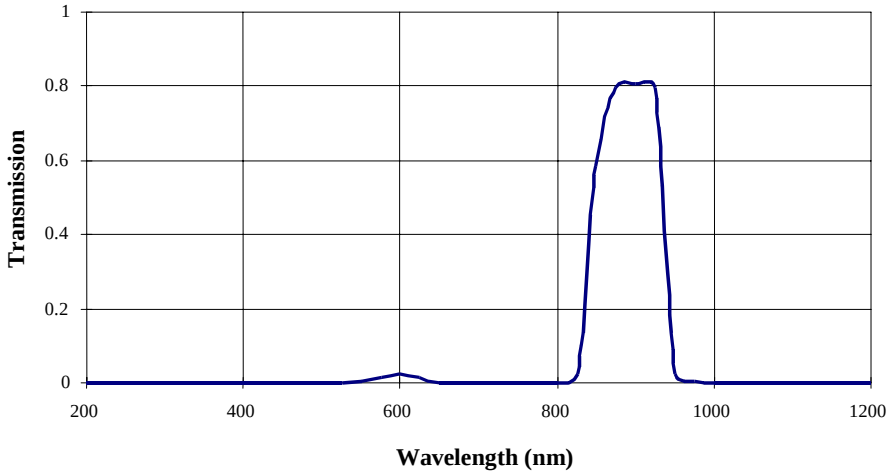
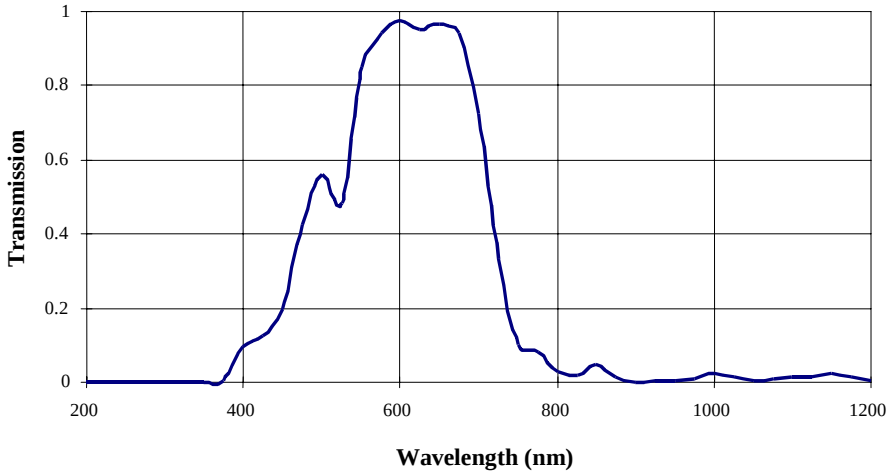
COMPLIMENTARY SILICON PHOTODIODE DEPOSITED FILTERS

The following sample filters are deposited directly onto the active surface of a silicon photodiode. The response illustrated is the combination of the interference filter and the photodiode. The process used is patented by Semelab Plc. and is most advantageous for higher volume requirements. Alternative filter combinations can be developed to suit individual customer requirements

INFRA RED BANDPASS ON SILICON PHOTODIODE



'EYE RESPONSE' BANDPASS ON SILICON PHOTODIODE



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